DRAFT REGULATORY GUIDE

C-225 (E)

EMERGENCY PLANNING AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES AND MILLS

Issued for public comments by the
Atomic Energy Control Board
November 1999

Atomic Energy Control Board | Commission de contrôle de l'énergie atomique

Canada

AECB Regulatory Documents

The Atomic Energy Control Board (AECB) operates within a legal framework that includes law and supporting regulatory documents. Law includes such legally enforceable instruments as acts, regulations, licences and directives. Regulatory documents such as policies, standards, guides, notices, procedures and information documents support and provide further information on these legally enforceable instruments. Together, law and regulatory documents form the framework for the regulatory activities of the AECB.

The main classes of regulatory documents developed by the AECB are:

- **Regulatory Policy:** a document that describes the philosophy, principles and fundamental factors used by the AECB in its regulatory program.
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- **Regulatory Guide:** a document that provides guidance or describes characteristics or practices that the AECB recommends for meeting regulatory requirements or improving administrative effectiveness.
- **Regulatory Notice:** a document that provides case-specific guidance or information to alert licensees and others about significant health, safety or compliance issues that should be acted upon in a timely manner.
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Document types such as regulatory policies, standards, guides, notices and procedures do not create legally enforceable requirements. They support regulatory requirements found in regulations, licences and other legally enforceable instruments. However, where appropriate, a regulatory document may be made into a legally enforceable requirement by incorporation in an AECB regulation, a licence or other legally enforceable instrument made pursuant to the *Atomic Energy Control Act*.

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NOTICE

On March 20, 1997, Bill C-23, the *Nuclear Safety and Control Act* (*NSC Act*, the Act), received Royal Assent. New regulations that are derived from this Act will become law and replace the existing regulations. Draft Regulatory Guide C-225 references the *NSC Act* and new regulations, which will come into force in 2000 on a date to be fixed by order of the Governor in Council.

About this document

Comments

In order for interested persons to determine this document's impact and value, public comments are being solicited. At the end of the comment period, all comments will be studied to determine how best to improve the document. Unless otherwise requested, a copy of all comments received will be placed in the AECB Library, in Ottawa. Comments on this guide will be most helpful if received in writing by December 31, 1999. Reference our file number 1-8-8-225, and direct enquiries and/or comments to the address below.

Document availability

The document can be viewed on the AECB internet website at www.aecb-ccea.gc.ca. Copies of C-225 may be ordered in English or French from:

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Contents

About this document i

Comments i

Document availability i

Purpose v

Scope v

1. Definition of "Emergency Plan" 1

2. Background 1

2.1 Overview of Canada's emergency planning framework 1

2.2 Regulatory and legislative framework 2

2.3 Licensing process 3

3. Contents of Emergency Plans 4

3.1 Introduction 4

3.2 Documentation of the emergency plan 5

3.3 Basis for emergency planning 5

3.4 Personnel selection and qualification 5

3.5 Emergency preparedness and response organizations 6

3.6 Staffing levels 6

3.7 Emergency training, drills and exercises 7

3.8 Emergency facilities and equipment 8

3.9 Emergency procedures 9

3.10 Assessment of emergency response capability 11

3.11 Assessment of emergencies 11

3.12 Activation and termination of emergency responses 11

3.13 Protection of facility personnel and equipment 12

3.14 Interface with off-site organizations 12

3.15 Recovery program 13
3.16 Public information program 14
3.17 Public education program 14

Acronyms

AEC Act	*Atomic Energy Control Act*
AECB	Atomic Energy Control Board
CNSC	Canadian Nuclear Safety Commission
NSC Act	*Nuclear Safety Control Act*
FNEP	Federal Nuclear Emergency Plan

Purpose

This regulatory guide is intended to help (1) applicants for operating licences for Class I nuclear facilities and (2) applicants for licences in respect of uranium mines and mills to develop emergency measures that satisfy the following:

- paragraph 6(k) of the *Class I Nuclear Facilities Regulations* and subparagraph 3(c)(x) of the *Uranium Mines and Mills Regulations*
- the requirements of subsection 24(4) of the *Nuclear Safety and Control Act*, by demonstrating that the applicant will, in carrying on the proposed activity, make adequate provision for the protection of the environment, the health and safety of persons, and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

The guide is also intended to aid the Canadian Nuclear Safety Commission (CNSC) in its evaluations of the adequacy of the emergency measures proposed by the above-mentioned applicants.

Scope

This draft guide, C-225, applies to applicants for a CNSC licence to operate a Class I nuclear facility, to applicants for uranium mine and mill licences, and to CNSC staff involved in assessments of proposed and existing emergency measures.

The guide describes and discusses the elements of emergency preparedness and response that licence applicants should typically consider when they are developing plans to prevent or mitigate the effects of accidental releases from a Class I nuclear facility or a uranium mine or mill.

1. Definition of "Emergency Plan"

In this guide, the term "emergency plan" refers to the "measures" required of applicants and licensees under paragraph 6(k) of the *Class I Nuclear Facilities Regulations* and subparagraph 3(c)(x) of the *Uranium Mines and Mills Regulations*.

Accordingly, an emergency plan for a Class I nuclear facility or a uranium mine or mill consists of a description of a proposed or actual program to cope with accidental releases of nuclear substances and hazardous substances. This program encompasses both emergency preparedness and emergency response measures. It ensures that appropriate emergency response capabilities are developed and maintained available for use.

Emergency plans for Class I nuclear facilities or uranium mines and mills should be commensurate with the complexity of the associated undertakings, and the probability and potential severity of the emergency scenarios associated with operation of these facilities.

An emergency plan may consist of one or several documents. It may incorporate pertinent information directly or by reference. Emergency plans may cover a broad range of issues. Specifics may vary to accommodate facility-specific needs and circumstances, regulatory requirements, and the individual preferences of licence applicants.

2. Background

2.1 Overview of Canada's emergency planning framework

Under the administrative framework of the Federal Nuclear Emergency Plan (FNEP), all levels of government and various agencies and organizations have responsibilities for developing and implementing emergency plans to deal with nuclear emergencies that occur outside the bounds of a nuclear facility licensed by the CNSC ("off-site" emergencies).

Consequently, where the operation of a Class I nuclear facility or a uranium mine or mill could involve, or give rise to, emergencies with significant off-site implications, its emergency plan must provide for (1) any cooperation and coordination that could be required within the larger framework of nuclear emergency preparedness and (2) response at the national and regional levels.

In Canada, the respective roles of the various levels of government in nuclear emergency preparedness and response derive from legislated responsibilities. Provincial and territorial governments have the primary responsibility for protecting public health and safety, property and the environment within their borders. The federal government regulates the peaceful uses of nuclear energy in Canada, manages

nuclear liability, and supports the responses of provinces to nuclear emergencies within their boundaries.

The federal government is also responsible for liaisons with the international community and their diplomatic missions in Canada, for assisting Canadians abroad, and for coordinating the national response to nuclear emergencies that occur in foreign countries, but impact on Canada.

2.2 Regulatory and legislative framework

The AECB is the federal regulatory agency that assures that nuclear facilities and materials do not pose undue risk to health, safety, national security and the environment.

At present, the AECB operates under the authority of the *Atomic Energy Control (AEC) Act* and regulations. These laws are soon to be replaced by the *Nuclear Safety and Control (NSC) Act* and regulations which are currently under development. Under the *NSC Act*, the AECB will become the CNSC, with continuing responsibilities for regulation of the nuclear industry.

The *NSC Act* and regulations prohibit persons or organizations from possessing, using, disposing of, or abandoning, certain nuclear materials without a licence from the CNSC. The regulations also stipulate prerequisites for licensing, including the information that is to be contained in licence applications.

As noted above, the *Class I Nuclear Facilities Regulations* and the *Uranium Mines and Mills Regulations* require that applications for operating licences include certain information related to emergency planning. Collectively, they stipulate that an application for a licence to operate a Class I nuclear facility or a uranium mine or mill shall contain a description of the proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons, and the maintenance of security, including measures to:

- assist off-site authorities in planning and preparing to limit the effects of an accidental release
- notify off-site authorities of an accidental release or the imminence of an accidental release
- report information to off-site authorities during and after an accidental release
- assist off-site authorities in dealing with the effects of an accidental release

- test the implementation of the measures to prevent or mitigate the effects of an accidental release

2.3 Licensing process

The licensing process for Class I nuclear facilities and uranium mines and mills begins when a person or organization applies for a licence in accordance with applicable legislation. It then proceeds progressively through regulatory review and licence issuance stages.

Upon receipt of a licence application in accordance with section 24 of the *NSC Act*, the CNSC will review the application to determine whether it includes the information required by law and whether this information demonstrates that the applicant is qualified to carry on the activity to be licensed, and will, in carrying on the proposed activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.

When assessing the adequacy of an emergency plan for a Class I nuclear facility or a uranium mine or mill, the CNSC will confirm the completeness of the plan by comparing it against a procedural checklist of potentially relevant considerations. Although not all of these considerations will necessarily be relevant to every situation, the generic use of a comprehensive checklist will help the CNSC assure that no significant aspects of emergency preparedness and response are overlooked during its reviews of individual plans.

The regulatory reviews of the adequacy of emergency plans will cover the following:

- documentation of the emergency plan
- basis for emergency planning
- personnel selection and qualification
- emergency preparedness and response organizations
- staffing levels
- emergency training, drills and exercises
- emergency facilities and equipment
- emergency procedures
- assessment of emergency response capability
- assessment of accidents

- activation and termination of emergency responses
- protection of facility personnel and equipment
- interface with off-site organizations
- recovery program
- public information program
- public education program

Following its review of a licence application, the CNSC, if satisfied that the requirements of section 24 of the *NSC Act* are met, will issue a licence in response to the application. CNSC licences will incorporate commitments from the applicant, and will contain any other conditions that the CNSC considers appropriate.

Regulatory sanctions are available under sections 25 and 48 of the *NSC Act,* and may be exercised if licensees fail to comply with legislation and the conditions of their licences, including those pertaining to emergency plans.

With regulatory approval, licensees may revise their emergency plans to take into account relevant factors, such as operating experiences or changed needs or circumstances.

3. Contents of Emergency Plans

3.1 Introduction

Although the *Class I Nuclear Facilities Regulations* and the *Uranium Mines and Mills Regulations* require that applications include, for specified purposes, certain information on emergency planning and response, the pertinent legislation does not define the required information in detail, nor does it prescribe a form in which it is to be organized and submitted. The applicant is responsible for submitting information that is relevant to its needs and circumstances, that meets the intent of the legislation and that enables regulatory review.

The following sections illustrate, under key subject headings, the factors that applicants should typically take into account when developing emergency plans to address their specific circumstances.

3.2 Documentation of the emergency plan

The legislated requirements pertaining to emergency plans for Class I nuclear facilities and uranium mines and mills are documentation requirements. They stipulate that information pertaining to the proposed emergency measures is to be included in the respective licence applications, and that these applications are also to describe the proposed facility, activities, substances and circumstances to which the emergency plan and requested licence are to apply.

Each emergency plan should indicate how its ongoing maintenance and revision will be controlled. These document control procedures should be suitably rigorous so as to ensure that the quality and relevance of the plan is maintained. Typically, these procedures should be consistent with control procedures for other licensing documents.

Any relevant agreements with other agencies or parties regarding emergency preparedness and response should also be referenced in or annexed to the emergency plan.

To provide assurance that a proposed emergency plan is supported by the licence applicant's senior management, the plan should be formally and explicitly approved by management prior to submission for regulatory review. The submitted plan should indicate that this approval has been received.

3.3 Basis for emergency planning

Emergency plans for Class I nuclear facilities and uranium mines and mills should encompass all emergency scenarios that could give rise to significant adverse impacts or consequences — whether on-site or off-site, radiological or non-radiological, severe or relatively minor. These scenarios should include accidental releases of all relevant nuclear and hazardous substances, including those assumed in the safety analysis submitted in support of licensing of the respective facilities.

3.4 Personnel selection and qualification

The success of emergency preparedness and response initiatives depends in part on the competence and actions of the persons involved. To be effective, these persons must be adequately qualified through training or experience, must be empowered with the necessary authority, and must be equipped with adequate resources. Accordingly, emergency plans should describe how the competence and effectiveness of those persons who are to be involved in emergency preparedness and

response will be assured, such as by application of selection criteria or qualification measures.

3.5 Emergency preparedness and response organizations

Emergency planning typically encompasses both emergency preparedness and emergency response activities. Accordingly, the emergency plans for Class I nuclear facilities and uranium mines and mills should assign and define formal responsibilities for developing, maintaining and implementing emergency preparedness and emergency response programs. For both programs, the plan should clearly describe the qualifications, duties, authorities, and accountabilities of the persons involved, and their respective organizational and reporting relationships. These descriptions should include all persons with a significant role, including the emergency response teams involved in first aid, fire fighting and radiation surveys.

To avoid conflicting demands in the event of emergencies, emergency plans should ensure adequate separation of the resources, both personnel and physical, assigned to emergency preparedness and emergency response activities, respectively. For large, complex facilities such as nuclear power plants, this typically requires and involves the establishment of organizational units with separate and express responsibilities for emergency preparedness and emergency response, respectively. However, for simpler, less hazardous facilities, it may be appropriate to assign delivery of the emergency preparedness program and delivery of the emergency response programs, respectively, to individuals or units that do not constitute separate entities dedicated to emergency preparedness and response.

3.6 Staffing levels

To ensure and maintain a credible state of emergency preparedness, nuclear facilities should be adequately staffed at all times. A special provision in section 49 of the *NSC Act* creates an offence for failing to maintain sufficient staff or for failing to carry out required duties at a nuclear facility. Accordingly, emergency plans for Class I nuclear facilities, or uranium mines and mills, should ensure that sufficient numbers of qualified personnel are available at all times to maintain the facilities in a safe condition and to respond effectively to emergencies.

To provide this assurance, emergency plans should clearly define the levels and nature of staffing to be maintained, and how this staffing will be assured. In particular, emergency plans should specify the minimum and optimum levels of staffing to be maintained for key positions or functions related to emergency preparedness and response. They should include appropriate arrangements to

compensate for scheduled and unscheduled absences of personnel. Typically contingency arrangements consist of designating responsible alternates, or retaining backup personnel or services from contractors or other external agencies.

3.7 Emergency training, drills and exercises

Adequate training and testing can help ensure that individuals and organizations are prepared for emergencies. Accordingly, emergency plans for Class I nuclear facilities and uranium mines and mills should provide for any training and testing of individuals or organizational units necessary to assure and demonstrate that they are qualified and able to completely fulfill their assigned emergency preparedness and response roles.

A typical emergency training program for a nuclear facility delivers relevant training to participants on the substance of the emergency plan, individual and organizational responsibilities, the use of emergency equipment and facilities, radiation and personnel protection, emergency communications and exchange of information, emergency procedures, and cooperation and interaction with other on-site and off-site authorities.

Emergency training may consist of both formal and informal instruction, including workplace and classroom instruction, and emergency drills and exercises.

Drills and exercises train participants; and test and measure the effectiveness of emergency training, the quality of emergency response programs; and the capabilities and performances of people, facilities and equipment. Emergency drills and emergency exercises usually differ in complexity and purpose.

Emergency exercises simulate emergency events over a minimum of several hours in order to test the integrated performance of the emergency response program. When correctly designed and conducted, these exercises simultaneously measure and demonstrate the preparedness and competence of participants, the quality of the associated procedures, and the effectiveness of the administrative framework. Deficiencies that are identified during exercises can be rectified in a timely manner to provide greater assurance that the emergency plan can and will be implemented successfully in the event of a real emergency.

Exercises normally involve a large number of on-site and off-site stakeholders, including regional, provincial, federal and international authorities.

Emergency drills are more limited in scope and purpose, typically involving testing a procedural or physical component of the emergency response program. Drills may be conducted as an initial or periodic test , as a supervised training session, or as an

evaluation of a remedial event. For example, after steps are taken to correct a weakness identified by an emergency exercise, the effectiveness of the remedial measures may be further evaluated by a drill.

Accordingly, an emergency plan for a Class I nuclear facility or a uranium mine or mill should clearly describe any proposed training and relevant supporting information, including:

- the objectives and content of the planned training
- how the training is to be delivered to meet objectives
- the qualifications required of training instructors
- the staff positions for which incumbents will be required to undertake periodic or on-going training
- the training requirements for contractors and off-site organizations that support or participate in on-site activities (e.g. firefighters, police personnel, ambulance drivers, hospital staff)
- the objectives, plans, schedules, procedures and assessment criteria for the conduct of emergency drills and exercises
- the positions that are responsible for managing, planning, and evaluating drills and exercises
- procedures and criteria for evaluating the results of emergency drills and exercises and for taking follow up actions
- how the results of training (courses, drills and exercises) will be recorded, and the records maintained

3.8 Emergency facilities and equipment

Emergency plans should describe the services, equipment, supplies and facilities that are to be available to cope with emergencies. These needs will be determined by facility-specific circumstances.

The facilities that could be needed in an emergency include:

- administration facilities
- technical support and control centers
- personnel/public assembly areas
- an emergency operations coordination centre
- a center to integrate on-site activities with off-site programs

- first aid or medical facilities
- aboratory facilities

The following equipment and materials might also be needed:

- an emergency source of electrical power
- reference materials, such as accurate versions of charts, maps, plans, drawings, diagrams, specifications and procedures
- safety and personnel protection equipment and supplies (e.g., fire-fighting, physical and respiratory protection)
- administrative aids, such as status boards and reference materials
- fixed or portable instruments or equipment, as required, to warn, detect, measure, monitor, survey, analyze, record, assess, process, treat, transport, announce, communicate or compute

If emergency facilities, equipment and materials are to be useful when needed, they must be in suitable condition. Accordingly, emergency plans should include provisions to assure that the emergency equipment, facilities or materials remain in acceptable condition at all times. These provisions could include inspection, testing, maintenance or replacement, within formal systems of quality control and inventory control and accounting.

3.9 Emergency procedures

Procedures are important elements of emergency plans, and are fundamental to the success of emergency preparedness and emergency response programs.

Emergency preparedness programs typically include procedures for:

- conducting emergency exercises
- assigning personnel to emergency response functions
- testing, maintaining; and assuring the availability of emergency facilities and equipment (e.g., sirens, telecommunications equipment, monitoring equipment)
- tracking developments and actions
- detecting and assessing potential emergencies
- educating the public

- updating the emergency plan

Emergency response programs typically include procedures for:

- assigning responsibilities and accountabilities
- assessing and classifying emergencies
- assessing source terms and consequences
- activating emergency responses
- implementing emergency responses
- notifying and alerting site personnel and other stakeholders (on-site and off-site communications)
- protecting on-site and off-site personnel
- assembling, protecting and evacuating personnel
- controlling exposures to radiation, and radioactive and hazardous materials
- limiting the occurrence and spread of radioactive contamination
- responding to injuries, over-exposures or contamination incidents
- post-accident monitoring and assessments of systems, effluents and conditions (e.g., observations, tests, measurements, collection of samples, sample preparation and analysis, reporting of sampling, measurement and test results)
- documenting and controlling the exchange of information
- effecting scheduled shift changes and workplace turnovers
- controlling vehicular and human traffic
- directing, controlling and supporting emergency responses
- implementing corrective actions or remedial measures
- controlling vehicular and personnel traffic
- maintaining the security of nuclear materials
- responding to injuries or fatalities

The emergency plan may incorporate emergency preparedness and response procedures directly, or it may reference pertinent documents, such as the facility procedures manual.

3.10 Assessment of emergency response capability

CNSC licensees should review their emergency response programs at regular intervals to ensure that these programs remain updated. Accordingly, emergency response programs should include document control procedures that specify who (position or unit) is to review and update the program on a ongoing basis, and how this is to be done.

The emergency response program should provide the responsible persons with the necessary autonomy and authority. It should specify the frequency of emergency responses, and how the emergency programs are to be detected, tracked, corrected and reported.

3.11 Assessment of emergencies

When an emergency is detected or suspected, facility personnel must determine its implications or consequences. Accordingly, emergency plans for Class I nuclear facilities and uranium mines and mills should describe how the relative and absolute severity of emergencies are to be determined and categorized. The plans should describe the methods and procedures to be followed when assessing pertinent conditions, needs and parameters, such as:

- the status, integrity and stability of the associated facilities and their components
- quantities, concentrations, or release-rates of radiation, contaminants, or hazardous materials
- on-site and off-site impacts on or threats to health, safety, national security and the environment
- requirements for routine and contingency supplies, equipment or other services or resources
- requirements for compilation and maintenance of records

3.12 Activation and termination of emergency responses

The emergency plan should describe the procedures for initiating and terminating responses to both on-site and off-site emergencies associated with facility operations. The plan should identify the organizations, positions or individuals who are to be notified in the event of a suspected or actual emergency, as well as those responsible for activating emergency responses; for completing the notifications required as part of the emergency response phase; and for terminating the emergency response phase.

The process for notifying off-site stakeholders of an on-site emergency at a Class I nuclear facility or a uranium mine and mill should be compatible with those of any complementary provincial and federal off-site emergency plans.

3.13 Protection of facility personnel and equipment

During an emergency, facility personnel and essential equipment must be adequately protected.

To protect on-site and off-site personnel during a nuclear emergency, a combination of normal and abnormal measures may be necessary. Accordingly, emergency plans for Class I nuclear facilities and uranium mines and mills should provide for both routine administrative controls and any special personnel-protection measures that could be necessary in the event of emergencies. These emergency provisions could include:

- establishing or designating areas for the emergency assembly of site personnel
- implementing special administrative measures, such as action level programs, to control radiation doses
- accounting for site personnel
- conducting routine or special radiation surveys
- providing routine or special dosimetry services
- providing search and rescue, decontamination, and first aid services
- providing any other emergency equipment, instruments, materials, facilities and services that are necessary to assure that on-site and off-site personnel are adequately protected

In addition to providing for the protection of people during emergencies, emergency plans should identify essential equipment, and describe how its operation and effectiveness during emergencies are assured. Essential equipment consists of the equipment required to detect, assess, or cope with potential emergencies. The emergency plan should describe the proposed procedures or systems for protecting essential equipment.

3.14 Interface with off-site organizations

To assure that responses to emergencies will be consistent, efficient and effective, it is desirable that all jurisdictions, organizations and persons involved in the administration and delivery of emergency preparedness and response programs

cooperate and coordinate with each other. Accordingly, the operators of Class I nuclear facilities and the operators of uranium mines and mills may need to coordinate and cooperate with other jurisdictions and organizations in the event of a facility emergency with off-site safety implications. To assure effective interfaces between facility personnel and external stakeholders in such emergencies, the facility emergency plan and any regional, provincial and national emergency preparedness and response plans and programs dealing with any off-site implications of facility emergencies, must be suitably compatible. Thus, where necessary, facility emergency plans for Class I nuclear facilities and uranium mines and mills should be compatible with the off-site emergency preparedness and response programs of regional, provincial and federal jurisdictions and organizations.

In particular, facility emergency plans should:

- identify the jurisdictions, organizations, organizational units or persons that could be formally involved in emergency preparedness and response activities pertaining to facility emergencies with off-site impacts
- describe the administrative procedures, processes and resources whereby facility personnel and personnel of external organizations, units and jurisdictions will cooperate and interact in emergency preparedness and response activities pertaining to off-site impacts from facility emergencies
- reference or incorporate any agreements between the facility operator and other jurisdictions, organizations or personnel, regarding cooperation and interaction in emergency preparedness and response activities to address off-site impacts from facility emergencies
- describe how the facility operator will ensure that the resources required to cooperate in off-site emergency preparedness and response matters will be available and provided when needed

3.15 Recovery program

An emergency plan for a Class I nuclear facility or a uranium mine or mill should include provisions to restore the facility to normal operations after the termination of an emergency. These provisions should include a recovery plan that:

- identifies the organizational unit — individual or group — that is responsible for directing and assuring effective recovery
- defines the responsibilities of the organization unit that is responsible for assuring recovery

- identifies and describes the resources (personnel, facilities, equipment) that are to be available for recovery purposes
- describes how personnel will be protected when implementing or assessing the recovery program (e.g., personnel protection measures for entry into hazardous areas) and
- provides for post-accident assessments of the causes, details, impacts or consequences of accidents

3.16 Public information program

The emergency plan should include, directly or by reference, appropriate provisions to communicate pertinent information to the public during an emergency. For complex facilities such as nuclear power plants, these provisions typically consist of communications policies and strategies that formally define the roles, responsibilities and essential qualifications of communications personnel. These arrangements typically require those responsible for communicating key information to the public to possess appropriate training, experience, and skills in public relations. During an emergency at a nuclear facility, the duties of its communications personnel can range from preparing or editing communications materials to coordinating and controlling the release of pertinent information to external stakeholders, such as the public, the media and other emergency organizations.

3.17 Public education program

The emergency plan for a Class I nuclear facility or a uranium mine or mill should take into account any need for education of the public with respect to emergencies at the facility, and their implications. Where a public education program appears warranted to assure public understanding of how to participate and cooperate effectively in the event of an accident at the facility, the facility emergency plan should describe such a program. This description should stipulate who will be responsible for delivery of this program, what their responsibilities are, how the program will be delivered, and what the program will entail.